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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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## FULL CONTENTS

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### [Claim(s)]

[Claim 1] When carrying out the suction exhaust air of melting, moisture, volatile matter content, etc. which knead and are produced from resin in the vent part 13 with the vacuum pump 4, driving a screw 10 and sending resin ahead along the slot of said screw, It is the deaeration method of the powder making machine characterized by reducing the power of absorption of said vacuum pump 4 when the torque value of said screw 10 is below a predetermined value.

[Claim 2] It consists of a cylinder 1 and a screw 10 prepared in this cylinder. Melting and kneading of are done in process in which resin is ahead sent along the slot of said screw 10. And with vent equipment, the moisture produced from resin, volatile matter content, etc. are vent equipment for injection molding machines by which suction exhaust air is carried out, and [ said vent equipment ] The vent hole 2 prepared in said cylinder 1, and the vacuum pump 4 which attracts compulsorily the moisture which connects with this vent hole and is produced from resin, volatile matter content, etc., Consist of a control means 5 to control the power of absorption of this vacuum pump, and a torque detection means to detect the torque value of said screw 10, and [ said control means 5 ] Vent equipment for powder fabrication characterized by controlling so that the degree of vacuum which acts on the vent part 13 of said vacuum pump 4 will become small, if the torque value detected with said torque detection means is lower than a predetermined value.

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] If this invention consists of a cylinder and a screw prepared in this cylinder and this screw is driven It is related with the vent equipment for powder fabrication with which the operation of the deaeration method of a powder making machine and this method which carries out the suction exhaust air of melting, the moisture which it is kneaded and is produced from resin in a vent part, the volatile matter content, etc. in process in which resin is ahead sent along the slot on the screw is presented.

[0002]

[Description of the Prior Art] Outline composition of the injection equipment of an injection molding machine is carried out as everyone knows from the screw driven within a cylinder and this cylinder. It

has the screw which drives similarly the vent type injection equipment which can miss the moisture which produces resin from resin in melting and the process to knead, volatile matter content, etc. outside within a cylinder and this cylinder. And the feed section to which powder material is supplied from a hopper to a cylinder or a screw, It is classified with the 1st metaling part located in the lower stream side of this feed section, the vent part by the side of the lower stream of this 1st metaling part, and the 2nd metaling part by the side of that lower stream, and the screw head is prepared at the tip of the 2nd metaling part. The slot of the screw located in a vent part is deep. Or the shaft diameter of the screw of a vent part is small. Moreover, the amount of sending of resin in the 1st stage which consists of a feed section and the 1st metaling part is constituted so that it may become smaller than the amount of sending of resin of the 2nd stage which consists of a vent part and the 2nd metaling part. And a vent hole is prepared in the cylinder located in a vent part, and the vacuum pump is connected to this vent hole.

[0003] Therefore, if resin is supplied to a feed section from a hopper and a screw is rotated, plasticization kneading will be carried out in the exothermic operation by shearing by the heat applied from the outside, and rotation of a screw, friction, etc., and resin will be sent to the tip part of a screw. Since the amount of sending of resin of the 2nd stage is larger than the amount of sending of the 1st stage at this time, in a vent part, space which is not filled with melting resin is made in a flight. Thus, since space is made, the suction exhaust air of moisture, volatile matter content, etc. which are produced from resin can be compulsorily carried out outside with a vacuum pump from a vent hole, without leaking melting resin outside.

[0004]

[Problem to be solved by the invention] As mentioned above, the suction exhaust air only of moisture and \*\*\*\*\* which are produced from resin can be carried out outside also in the conventional vent type cylinder. However, since the conventional vacuum pump is interlocked with melting and kneading operation and is started, there is a fault in which powdered resin is attracted by a piping system, the vacuum pump, etc. from a vent hole depending on the case. Furthermore, [ if it explains in detail, and sufficient powdered resin is supplied from the hopper, will fuse powdered resin with the heat obtained in an exothermic operation of the shearing force by rotation of a screw frictional force, etc. and the heat applied from the outside, and it will be sent to a vent part, but ] Since sufficient shearing force, frictional force, etc. will no longer be acquired if the amount of supply decreases, while melting-ization has been powder behind time, it may be sent to a vent part. Since powder-like resin is light when it does so, it is drawn in by the vacuum pump. Once it is drawn in, a piping system can be included, powder-like resin adheres to a vacuum pump, and troublesome cleaning is needed. Therefore, while this invention can attract compulsorily outside moisture, volatile matter content, etc. which are produced from resin Even if powdered resin is sent to a vent part in the state of non-melting, resin of the non-molten state aims at offering the vent equipment for powder fabrication which is not attracted outside and with which operation of the object for the deaeration methods of a powder making machine and this method is presented.

[0005]

[Means for solving problem] When carrying out the suction exhaust air of melting, moisture, volatile matter content, etc. which knead and are produced from resin in a vent part with a vacuum pump, driving a screw and sending resin ahead along the slot of said screw, in order that this invention may attain the above-mentioned purpose, When the torque value of said screw is below a predetermined value, it is constituted so that the power of absorption of said vacuum pump may be reduced. Invention

according to claim 2 consists of a cylinder and a screw prepared in this cylinder. Melting and kneading of are done in process in which resin is ahead sent along the slot of said screw. And with vent equipment, the moisture produced from resin, volatile matter content, etc. are vent equipment for injection molding machines by which suction exhaust air is carried out, and [ said vent equipment ] The vent hole prepared in said cylinder, and the vacuum pump which attracts compulsorily the moisture which connects with this vent hole and is produced from resin, volatile matter content, etc., It consists of a control means to control the power of absorption of this vacuum pump, and a torque detection means to detect the torque of said screw, and if the torque value detected with said torque detection means is lower than a predetermined value, said control means will be controlled so that the degree of vacuum of said vacuum pump becomes small.

[0006]

[Function] Invention according to claim 2 acts as follows. That is, a screw is driven while supplying resin. If it does so, melting and kneading of resin will be done in the process ahead sent along the slot on the screw. At this time, the torque value of a screw is inputted into a control device from a torque detection means. Then, a control device will maintain for example, the ON state of a vacuum pump, if the torque value inputted has reached the predetermined value. The suction exhaust air of moisture, volatile matter content, etc. which are carried out and are produced from resin in melting and the process kneaded as \*\* is compulsorily carried out by a vacuum pump. On the other hand, if the torque value inputted by the amount of supply of resin becoming less is smaller than a predetermined value, a control device will be controlled to turn off a vacuum pump so that the degree of vacuum of a vacuum pump becomes small. Thereby, even if resin of a non-molten state reaches a vent part, it is not drawn in by the vacuum pump.

[0007]

[Working example] The work example of this invention is explained hereafter. Drawing 1 is the sectional view showing one work example of this invention. The injection machine concerning this example is also equipped with the tubed cylinder 1 and the screw 10 prepared in the inside free [ a drive in the hand of cut and the direction of an axis ] as shown in this figure. A screw 10 is constitutionally classified toward a left in a figure with a feed section 11, the 1st metaling part 12, the vent part 13, and the 2nd metaling part 14 from the method of the right, and the screw head 15 is formed in the front part of the 2nd metaling part 14. Moreover, as for a feed section 11 and the 1st metaling part 12, 1st stage ST1 and the vent part 13, and the 2nd metaling part 14 are classified into 2nd stage ST2. Also in this example, the amount of sending of resin in 1st stage ST1 is smaller than the amount of sending of 2nd stage ST2. Moreover, the slot of the screw 10 of the vent part 13 is deep as compared with other portions.

[0008] The vent pipe 2 is formed in the cylinder 1 equivalent to the vent part 13, and the suction pipe 3 is connected to this vent pipe 2. And the vacuum pump 4 is infixed in the suction pipe 3. The vacuum pump 4 is driven by an electric motor by this example, and this electric motor is controlled by the control device 5. Since a screw 10 is rotated, in the figure, the electric motor 7 is formed in the method of the right. Although the electric motor 7 rotates a screw 10 through a deceleration mechanism, the torque of a screw 10 is measured with the current value of the electric motor 7, and it is inputted into the control device 5 with a line 8. The torque value which could set up the torque value of the screw 10 beforehand and was set up while the control device 5 controlled the constituent factor required for injection molding, When smaller than the torque value to which the torque value measured with the

current value of the electric motor 7 was compared, and the measured torque value was set, it also has the function which outputs the signal which turns off the motor of the vacuum pump 4 by a line 6.

[0009] Next, an operation of the above-mentioned work example is explained. The torque value of a screw 10 in case melting of the resin is carried out to the control device 5 and it is sent to it at the vent part 13 is set up beforehand. While supplying powdered resin to a feed section 11 from a hopper 16, a screw 10 is rotated by the electric motor 7. Resin is the process sent to 1st stage ST1 to 2nd stage ST2 so, then as everyone knows. Melting and kneading of are done by heating by the heaters 17 and 17 and -- which are prepared in the perimeter part of the cylinder 1, and the exothermic operation by the shearing force by rotation of a screw 10, frictional force, etc., and it is accumulated ahead. If specified quantity accumulation is carried out, a screw 10 will be driven and it will eject from a nozzle to a metallic mold 19. A model difference of the cooling solidification is waited for and carried out, and a cast is taken out. It carries out [ mold clamp ], the same operation as the following is repeated, and a cast is obtained.

[0010] Since resin is not filled in the early stage where the making machine was started, between the flights of a screw 10 when obtaining a cast as mentioned above for example, big shearing force, frictional force, etc. do not act. Therefore, the rotation torque of a screw 10 is also small. So, the torque value of the screw 10 measured with the current value of the electric motor 7 is smaller than the preset value beforehand set as the control device 5, and the control device 5 outputs the signal which turns off the electric motor of the vacuum pump 4 by a line 6. Since the vacuum pump 4 will not be started if it does so, even if powdered resin of a non-molten state compares and is sent to the vent part 13, powdered resin is not attracted by the suction pipe 3 and vacuum pump 4 grade from the vent pipe 2.

[0011] Since the shearing force of a predetermined size, frictional force, etc. will come to act if an early stage passes and it comes to be addressing[ to the specified quantity ]-supplied, the torque value of a screw 10 goes up. Since torque value is inputted into the control device 5 by the line 8, if it becomes larger than a preset value, the signal which turns on the electric motor of the vacuum pump 4 will be outputted. [ the amount of sending of resin in 1st stage ST1 ] It is smaller than the amount of sending of 2nd stage ST2, and since the slot of the screw 10 of the vent part 13 is deep as compared with other portions, space where resin is not filled is made between the flights of the vent part 13, and a predetermined degree of vacuum acts on this space through the vent pipe 2 and the suction pipe 3. Therefore, the suction exhaust air of moisture, volatile matter content, etc. which are produced from resin in process of melting and kneading is carried out by the vacuum pump 4. If the quantity of the resin which supply of resin to a hopper 16 stops by a certain cause, and is supplied to a feed section 11 decreases That is, since sufficient exothermic operation by shearing force, frictional force, etc. will not be obtained if resin ceases to be filled between the flights of a screw 10, melting is overdue and resin of a non-molten state comes to reach the vent part 13. Since the rotation torque of a screw 10 becomes smaller than a preset value as mentioned above at this time, the control device 5 outputs the signal which turns off the electric motor of the vacuum pump 4. Therefore, it is not drawn in by vacuum pump 4 grade even if resin of a non-molten state reaches the vent part 13.

[0012] Although the electric motor of the vacuum pump 4 is turned on and turned off by the rotation torque value of the screw 10, resin of a non-molten state can also control the degree of vacuum of the vacuum pump 4 by the above-mentioned work example to the grade which is not attracted by vacuum pump 4 grade. For example, the rotation torque and the preset value of a screw 10 are compared, and phase control of the number of rotations of the electric motor of the vacuum pump 4 can also be carried

out according to the difference. Moreover, in the suction pipe 3 by the side of the upper stream of the vacuum pump 4, branch-pipe 3' can be prepared, and a flux control valve or the opening-and-closing valve 9 can be formed in this branch-pipe 3', and this opening-and-closing valve 9 can also be controlled by the control device 5 as shown in the figure. For example, as mentioned above, it can also carry out so that the torque value of the screw 10 measured with the current value of the electric motor 7 may be compared with the preset value beforehand set as the control device 5 and the control device 5 may open and close the opening-and-closing valve 9 according to the difference, or so that valve travel may be adjusted. Since the open air will be attracted by the vacuum pump 4 if the opening-and-closing valve 9 is made into \*\*, or if valve travel is enlarged, big negative pressure ceases to act on the vent part 13. Therefore, it is not drawn in by vacuum pump 4 grade even if resin of a non-molten state is sent. Furthermore, opening-and-closing valve 9' is prepared in the suction pipe 3, when the torque value of a screw 10 is below a preset value, the suction pipe 3 is intercepted by opening-and-closing valve 9', and the power of absorption of the vacuum pump 4 can be less than the vent part 13. Thus, operation will acquire the effect that the life of an electric motor becomes long, as compared with the case where the electric motor of the vacuum pump 4 is turned on and turned off.

[0013]

[Effect of the Invention] Since the vacuum pump is formed in vent equipment as mentioned above according to this invention, a screw is driven, and melting and when kneading, the suction exhaust air of moisture, volatile matter content, etc. which are produced from resin can be compulsorily carried out with a vacuum pump, sending resin ahead along the slot on the screw. And since a control device reduces the power of absorption of a vacuum pump when the torque value of a screw is below a predetermined value (i.e., when resin of powdered voice may be sent), even if resin of a non-molten state compares and is sent, the effect peculiar to this invention of not being drawn in by the vacuum pump is acquired.

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[Brief Description of the Drawings]

[Drawing 1] It is the mimetic diagram in which making a part of one work example of this invention into a section, and showing it.

[Explanations of letters or numerals]

1 Cylinder 2 Vent Pipe (Vent Hole)

4 Vacuum Pump 5 Control Device

10 Screw 13 Vent Part

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[Drawing 1]

